

# Antia-Buch versus Franssen-Frechner Technique

Rasha Abdelkader, MD\*

Marco Malahias, MD†

Sahar Ahmed Abdalbary, PhD‡

Ayman Noaman, MD\*

**Background:** We performed a retrospective study comparing 2 patient groups. Each cohort included 22 cases of skin cancer of the external ear. Each patient required resection of the affected part of the external ear, followed by flap reconstruction.

**Methods:** The patients in Cohort A underwent external ear reconstruction with a classic Antia-Buch flap, as described by Antia and Buch in 1967: The defect was closed by mobilizing an advancement flap from the root of the helix (upper ear), which was closed in a V-Y fashion, after a rim of healthy scaphal cartilage was resected to allow approximation of the skin. The patients in Cohort B underwent external ear reconstruction with a modified Antia-Buch flap, as presented by Franssen and Frechner in 2010. Here, a wedge of skin was removed from the ear lobe (lower ear), to allow mobilization of an advancement flap from the caudal end of the ear, to close the defect.

**Results:** Both techniques allowed tension-free closure. Cohort B, however, required less dissection of the ear. The entire cephalic ear remained unaffected and no scaphal cartilage was sacrificed, thus preserving ear width, with scars that were overall less visible. Also, the loss in ear height associated with Cohort B was easily symmetrized by contralateral ear lobe reduction.

**Conclusions:** Cohort B achieved closure with less ear dissection, achieving excellent morphological outcomes. The patients in Cohort B had superior levels of satisfaction with scars and ear symmetry than those in Cohort A. (*Plast Reconstr Surg Glob Open* 2021;9:e3498; doi: [10.1097/GOX.0000000000003498](https://doi.org/10.1097/GOX.0000000000003498); Published online 24 March 2021.)

## INTRODUCTION

A classic reconstructive technique for chondrocutaneous ear defects is the Antia-Buch flap, which was first described in 1967<sup>1</sup>. This method relies on bisecting the ear into an anterior skin-cartilage flap and a posterior skin flap (Fig. 1). Following this, an incision into the root of the helix is made, to allow ease of advancement of the root of the helix into the defect. To allow tension-free closure, a crescent of healthy cartilage is resected from the scapha, to permit ease of closure of the reconstruction.

The drawbacks of this technique include:

- Extensive bisection of most of the ear.
- Resection of healthy scaphal cartilage, which allows ease of closure, but ultimately results in ear width reduction, which is difficult to symmetrize with the other ear.

- A visible scar from the incision into the root of the helix, needed to allow the advancement of the cephalic chondrocutaneous flap.

A modification of this reconstructive method was described by Franssen and Frechner in 2010<sup>2</sup>: after a wedge of tissue is excised from the ear lobe, the lobe and the ear tissue caudal to the defect are mobilized and incorporated into the reconstruction (Fig. 1). This avoids the need to violate the root of the helix and cephalic part of the ear and also avoids the need to excise unaffected scaphal cartilage, thus leaving the ear width unaffected.

The main drawback of this technique is reduction in the ear height, due to incorporating the ear lobe into the reconstruction. This, however, is easily corrected by performing an immediate contralateral ear lobe reduction, which results in similar ear height and ear lobe shape bilaterally, with scars that are well hidden. Both types of reconstruction are performed under local anesthesia in a single stage, as a day case (Fig. 1).

## METHODS

We performed a retrospective analysis of 44 patients who presented to our unit with external ear malignancies requiring surgical resection followed by reconstruction. The patients were identified from the department's multidisciplinary team (MDT) audit database and were operated on by the same surgeon between May 2016 and June

From the \*Department of Plastic Surgery, Faculty of Medicine Kasr Al-Ainy, Cairo University, Cairo, Egypt; †University Hospitals Birmingham, Birmingham, United Kingdom; and ‡Orthopaedic Physical Therapy, Faculty of Physical Therapy, Nahda University in Beni Suef, Egypt.

Received for publication November 27, 2020; accepted January 13, 2021.

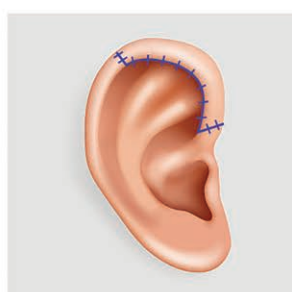
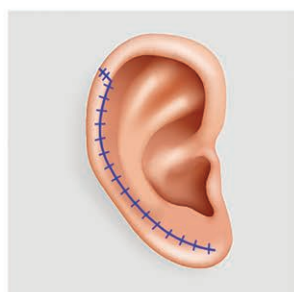
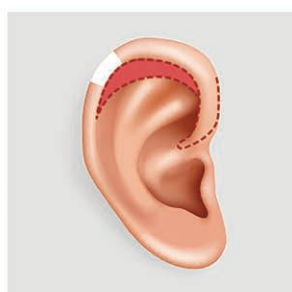
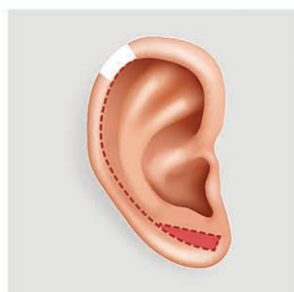
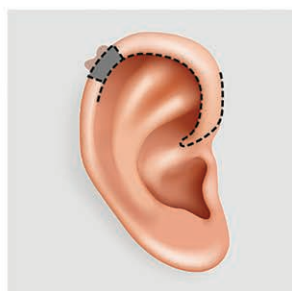
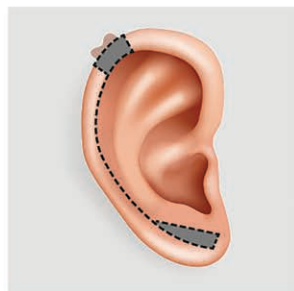
Copyright © 2021 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: [10.1097/GOX.0000000000003498](https://doi.org/10.1097/GOX.0000000000003498)

**Disclosure:** The authors have no financial interest to declare in relation to the content of this article.

## Franssen & Frechner's Technique

## Antia-Buch Technique



**Fig. 1.** Diagram of Antia-Buch (A-B) technique (right) and Franssen-Frechner (F-F) technique (left).

2020. All patients were treated as day-cases, after being counseled and consented in clinic a week before undergoing surgery.

The patients were divided into 2 cohorts of 22 patients each. The patients in Cohort A had undergone classic Antia-Buch (A-B) reconstruction based on the superior part of the ear. The patients in Cohort B had undergone reconstruction that followed the reconstructive methods of Franssen and Frechner (F-F), which incorporate the lower part of the ear in the reconstruction.

Chirocaine 1% was used for local anesthesia according to patient weight, with the maximum dose not exceeding 30ml of 1% Xylocaine, equivalent to 300 mg of the anesthetic. Anesthesia was achieved with an ear block targeting the auriculotemporal, great auricular,



**Fig. 2.** A-B technique: Cephalic view of basal cell carcinoma, on the superior pole of the left ear.

and lesser occipital nerves in addition to local infiltration for hydrodissection. In both cohorts, excision of the lesion was performed with a 4-mm margin, to achieve cancer clearance.

In Cohort A patients, the ear was dissected into an anterior chondrocutaneous flap and a posterior cutaneous flap (Figs. 2–5). Cephalically a V-Y advancement flap was created by incising the root of the helix, to allow advancement of a chondrocutaneous flap into the defect. A crescent of healthy scaphal cartilage was resected to reduce the ear width, thus allowing tension-free closure of the ear.

In Cohort B, the reconstruction was initiated by extending an incision from the defect's edge in a caudal direction along the scaphoid fossa into the ear lobe (Figs. 6–8). The caudal part of the ear was then bisected into an anterior chondrocutaneous flap and a posterior cutaneous flap. Only the ear caudal to the defect was bisected; a Burrow's triangle of ear lobe tissue (anterior lobe skin and fat) was excised, with the base of the triangle directed toward the cheek to allow advancement of the ear lobe in a cephalic direction. This flap was then advanced in a cephalic direction to close the defect of the resection directly. This resulted in some loss of ear height. To achieve ear height symmetrization, a full-thickness triangle from the contralateral ear lobe was excised, matching the ear height and ear lobe shape of the reconstructed, auricular cancer side.

In both cohorts, emphasis was placed on closing the defect with a tension-free repair using three 5/0 Monocryl anchoring sutures followed by 5/0 Prolene cutaneous closure; Jelonet was molded along the ear and a head bandage was applied and kept in situ for 7 days. The patients were placed on oral flucloxacillin 500mg 4 times per day for 5 days or Clarithromycin 500 mg 2 times per day for 5 days if the patient was allergic to penicillin.

All patients were given a postprocedure questionnaire regarding their perceptions of the final cosmetic results, specifically scar appearance and ear symmetry. They were asked to grade their results as either (1) excellent, (2) very good, (3) good, or (4) average or poor.





**Fig. 3.** A-B technique: Outline of 4-mm excision margin and flap incision with the ear split longitudinally to the external auditory meatus.



**Fig. 4.** Lesion excised and flap elevated, with cephalic scaphal cartilage trimmed.



**Fig. 5.** A-B technique: Single layer wound closure with continuous 5/0 Prolene.

## RESULTS

The total number of patients studied was 44. No complications such as infection, bleeding, hematoma, wound dehiscence, floppy ear, ear cupping, or cauliflower deformity were noted, and only 1 case had helical rim notching (from Cohort A). Mild postoperative erythema and swelling of the external ear was noted in all cases but had settled by 3 months.



**Fig. 6.** F-F technique: Lesion of the left ear with marking of excision margins of 4 mm, line of incision; wedge excision from lobe.

Cohort A contained 3 women and 19 men. The age range was between 56 and 92 years, with a mean age of 73 years.

The defect size varied between 1.8 and 3.5 cm. The defects were located in the upper third of the ear in 4 cases, and in the middle third of the ear in 18 cases (Fig. 9).

The cancers resected were basal cell carcinoma in 10 cases and squamous cell carcinoma in 12 cases (Fig. 9). Tumor clearance was achieved in 100% of cases. The patients rated the scar appearance as excellent in 8 cases, very good in 4 cases, good in 4 case, and average or poor in 6 cases (Table 1). The symmetry was rated as excellent in 3 cases, very good in 3 cases, good in 8 cases, and average or poor in 8 cases (Fig. 10).

Cohort B contained 4 women and 18 men. The age range was between 52 and 86 years, with a mean age of 72 years.

The defect size (Fig. 11) varied between 1.5 and 3.5 cm. The defects were located in the upper third of the ear in 7 cases and in the middle third of the ear in 15 cases.

The cancers resected were basal cell carcinoma in 11 cases and squamous cell carcinoma in 11 cases. Tumor clearance was achieved in 100% of cases (Fig. 11).





**Fig. 7.** F-F technique: Lesion excised from the superior pole; wedge excised from the ear lobe with the lower ear split longitudinally to the external auditory meatus.



**Fig. 8.** F-F technique: Wound closure in a single layer with continuous 5/0 Prolene.

The patients rated the scar appearance as excellent in 13 cases, very good in 8 cases, and good in 1 case (Table 2). The symmetry was rated as excellent in 16 cases, very good in 4 cases, and good in 2 cases (Fig. 12).

From the surgeon's perspective, the benefits of the F-F technique over the classic A-B technique include:

1. The cephalic part of the ear and the root of the helix are not violated because only the caudal part of the ear (the ear lobe and part of the ear caudal to the defect) are dissected into anterior and posterior flaps.
2. There is no need for resection of healthy scaphal cartilage to allow tension-free closure; so the ear's width is unaffected.
3. The ear height discrepancy can be easily and simultaneously corrected by a wedge resection from the contralateral ear lobe, allowing for symmetrical ears.

## DISCUSSION

By the age of 3 years, the ear reaches 85% of its adult size, with the remaining 15% size increase being achieved by early adolescence. The ear height should

correspond to the distance between the nasal ala and lateral brow. The distance from the lateral orbit to the ear usually equates to 1 ear height, and the external ear usually slants 21 degrees to 25 degrees outward. The distance from the mastoid to the posterior aspect of the helix is usually 10–12 mm in the upper third, 16–18 mm in the middle third, and 20–22 mm in the lower third. The long axis of the ear should be posteriorly inclined by approximately 20 degrees, with a conchoscaphal angle of approximately 90 degrees.<sup>3</sup>

The blood supply to the ear is derived from several auricular branches of the posterior auricular and superficial temporal arteries. The sensory supply to the ear is from the auriculotemporal, great auricular, lesser occipital, vagus, and glossopharyngeal nerves.

Up to 55% of auricular malignancies are situated on the rim of the helix<sup>6</sup> and external ear defects may be classified according to defect location (superior, middle, or inferior third), thickness (partial or full), and size [small (<1.5 cm), medium (1.5–2 cm), or large (>2 cm)].

Small defects can usually be closed directly or with minimal undermining and mobilization of native tissues, or with the use of geometric patterns described by Tanzer,<sup>7</sup> designed to approximate skin defects without

## Cohort A: Scar appearance



**Fig. 9.** Patient, tumor pathology, and postresection defect size in Cohort A.

**Table 1. Patient, Tumor Pathology, and Postresection Defect Size in Cohort A**

	Patient, Tumor Pathology, and Postresection Defect Size																					
Patient	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
BCC	✓							✓			✓	✓	✓		✓			✓	✓	✓		✓
SCC		✓	✓	✓	✓	✓	✓		✓	✓				✓		✓	✓				✓	
Defect size (cm)	2.0	1.8	3.5	2.2	2.7	3.4	3.5	2.9	3.0	2.6	2.5	2.9	3.0	3.3	1.9	2.6	2.9	2.8	3.2	3.3	3.2	3.4

## Cohort A: Symmetry between ears



**Fig. 10.** Ear symmetry in Cohort A.

tension. The auricula; repair described by Antia and Buch<sup>1</sup> in 1967 is based on a chondrocutaneous advancement flap suitable for moderate to large sized defects; if larger defects need to be addressed, a V-Y advancement

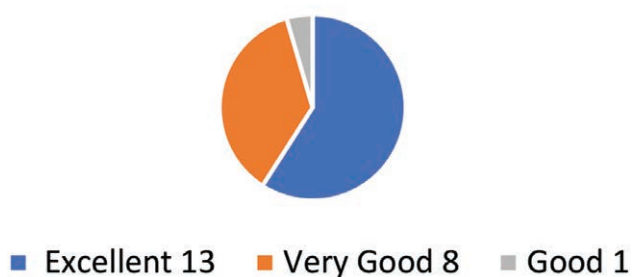
of the helical crus is incorporated into the design<sup>4</sup> with mandatory trimming of the scaphal cartilage to allow a tension-free wound closure.<sup>5</sup>

The F-F technique<sup>2</sup> addresses similar-sized defects, utilizing dissection principles similar to those of the A-B method, yet is based on the opposite pole of the ear.

Other techniques for closing large defects of the ear include the chondrocutaneous composite flap by Davis.<sup>8</sup> This is based anteriorly on the root of the helix and is used for the reconstruction of the entire superior pole of the ear, but requires a skin graft to the donor site. Another technique involves the use of the Orticochea<sup>9</sup> composite chondrocutaneous rotation flap, for the reconstruction of the entire superior pole, and is based on the lateral rim of the ear.

Various other approaches exist, to reconstruct large defects, that rely on the importation of adjacent, regional tissues, such as the 2-stage Diffenbach<sup>10</sup> flap, which recruits postauricular skin to cover a free contralateral cartilage graft. This will require skin flap division at 3 weeks.

## Cohort B: Scar appearance



**Fig. 11.** Patient, tumor pathology, and postresection defect size in Cohort B.

**Table 2. Patient, Tumor Pathology, and Postresection Defect Size in Cohort B**

Patient, Tumor Pathology, and Postresection Defect Size																						
Patient	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
BCC	√		√		√	√		√		√	√		√		√		√				√	
SCC		√		√			√		√			√		√		√		√	√	√		√
Defect size (cm)	1.9	1.9	2.2	3.2	1.7	2.3	2.2	3.1	2.0	3.1	1.8	1.5	2.5	2.4	2.2	3.4	3.0	2.7	1.3	2.4	3.5	3.1

## Cohort B: Symmetry between ears



■ Excellent 16   ■ Very Good 4   ■ Good 2

**Fig. 12.** Ear symmetry in Cohort B.

## CONCLUSION

Our study shows that the technique described by Franssen and Frechner requires less dissection of the external ear and results in superior cosmetic results than the classic Antia-Buch technique.

**Sahar Ahmed Abdalbary**

Department of Orthopaedic Physical Therapy

Faculty of Physical Therapy

Nahda University in Beni Suf

2, Street 107, Maadi

Cairo, Egypt

E-mail: [saharabdalbary@gmail.com](mailto:saharabdalbary@gmail.com)

## REFERENCES

1. Antia NH, Buch VI. Chondrocutaneous advancement flap for the marginal defect of the ear. *Plast Reconstr Surg.* 1967;39:472–477.
2. Franssen BBGM, Frechner BR. Caudal Antia-Buch reconstruction for helical defect reconstruction: Burow's triangle always in the lobule. *Eur J Plast Surg.* 2010;33:105–107.
3. Salgarello M, Visconti G. Combined technique in aesthetic otoplasty. In Shiffman MA, ed. *Advanced Cosmetic Otoplasty.* Berlin, Heidelberg: Springer-Verlag; 2013:209–233.
4. Crikelair GE. A method of partial ear reconstruction for avulsion of the upper portion of the ear. *Plast Reconstr Surg.* 1946;17:438–443.
5. Thorne CH, Beasley RW, Aston SJ, et al. Specific regional defects. In Thorne CH, Beasley RW, Aston SJ, et al., eds. *Grabb and Smith's Plastic Surgery.* Philadelphia, Pa.: Wolters Kluwer Health; 2007:301–304.
6. Blake GB, Wilson JS. Malignant tumours of the ear and their treatment. I. Tumours of the auricle. *Br J Plast Surg.* 1974;27:67–76.
7. Tanzer R. Deformities of the auricle. In Converse JM, ed. *Reconstructive Plastic Surgery.* 2nd ed. Philadelphia: WB Saunders; 1977.
8. Davis JE. Reconstruction of the upper third of the ear with a chondrocutaneous composite flap based on the crus helix. In Milton E, Tanzer RC, eds. *Symposium on Reconstruction of the Auricle.* St Louis: CV Mosby; 1974.
9. Orticochea M. Reconstruction of partial loss of the auricle. *Plast Reconstr Surg.* 1970;46:403–405.
10. Aguiar EA. Traumatic total or partial ear loss. In Evans GR, ed. *Operative Plastic Surgery.* New York: McGraw-Hill; 2000.